

MOHANLAL SUKHADIA UNIVERSITY, UDAIPUR

B. Sc. BIOTECHNOLOGY II YEAR TDC (2016-17)

Paper III: *Basics of Molecular Biology*

Unit-I

Introduction to molecular biology – historical background, nature of genetic material, experimental proof for DNA as genetic material, types of nucleic acids (DNA and RNA). Watson Crick model of DNA, other forms of DNA (A-form, B-form and Z-form), properties of DNA, DNA denaturation and renaturation, concept of central dogma, satellite DNA and tandem repeats.

15 Credit hours

Unit-II

DNA replication : mechanisms of prokaryotic DNA replication, semi-conservative model of replication, mechanism of DNA replication – discontinuous synthesis of DNA, RNA primer of DNA synthesis, DNA polymerases I, II, III and their role in DNA replication; eukaryotic DNA replication, Eukaryotic DNA polymerases, DNA ligases, mechanism of action and role in DNA replication; role of other proteins in DNA synthesis; DNA damage and repair.

15 Credit hours

Unit-III

Regulation of gene expression in prokaryotes : Transcriptional control; enzyme induction and repression, constitutive. Synthesis of enzymes, the operon hypothesis : genes involved in regulation – regulatory genes, promoter gene, operator gene, and structural gene, role of cAMP and cAMP receptor protein (CRP) in the expression of e.g. Lac operon, Arg operon, Tryptophan operon, His operon, catabolite repression. Brief account of eukaryotic gene regulation. Development and environmental regulation of gene expression.

15 Credit hours

Unit – IV

Transcription control by termination and anti-termination, mRNA splicing, genetic code, altered genetic code in ciliates and mitochondria, types of RNA, the assembly line for protein synthesis, wobble hypothesis, translation initiation and termination in prokaryotes, reading frame and open reading frame, translation initiation and termination in eukaryotes.

15 Credit hours

Unit – V

Post translational modification in prokaryotes and eukaryotes, protein sorting/trafficking and protein localization and translocation: synthesis of secretory and

membrane protein, import into nucleus, mitochondria, chloroplast and peroxisomes, receptors and signal transduction: channels and ion uptake.

15 Credit hours

Suggested Readings

1. Watson, J.D. Molecular Biology of Gene. Pearson Education.
2. Friefelder, D. Molecular Biology. Narosa Publishing House, New Delhi.
3. Weaver, R. Molecular Biology. McGraw Hill.
4. Lewin, B. Gene VIII. Pearson Education.
5. Lodish and Baltimore. Molecular Cell Biology. W.H. Freeman and Co.
6. Cooper, M. The Cell – A molecular approach. Sinauer.
7. Daniel. Molecular Cell Biology. Scientific American Books.
8. Smith. Molecular Biology. Faber and Faber Publications.
9. Dabre, P.D. Introduction to Practical Molecular Biology. John Wiley and Sons, Ltd.
10. Meyers, R.A. (Ed). Molecular Biology and Biotechnology : A comprehensive desk reference. VCH Publishers, New York.